

NATURAL RESOURCES CONSERVATION SERVICE
CONSERVATION PRACTICE STANDARD

HEAVY USE AREA PROTECTION (ACRE)

CODE 561

DEFINITION

The stabilization of areas frequently and intensively used by people, animals, or vehicles by establishing vegetative cover, by surfacing with suitable materials, and/or by installing needed structures.

regulations of particular concern include those involving land use, pollution control, property easements, wetlands, preservation of cultural resources, and endangered species.

Safety of the users shall be incorporated into the design of the heavy use area protection.

PURPOSES

This practice may be used as a part of a conservation management system to support one or more of the following purposes:

- Reduce soil erosion
- Improve water quantity and quality
- Improve air quality
- Improve aesthetics
- Improve livestock health

Design Load. The design load will be based on the type of traffic (vehicular, animal, or human) anticipated on the heavy use area. The minimum design load for areas that support vehicular traffic will be a wheel load of 4000 pounds.

Foundation. All site foundations shall be evaluated for soil moisture, permeability, texture, and bearing strength in combination with the design load and anticipated frequency of use.

A base course of gravel, crushed stone, or other suitable material and/or geotextile shall be provided on all sites with a need for increased load bearing strength, drainage, separation of material, and soil reinforcement. All areas to be paved shall have a 6 inch base course of gravel, crushed stone, or other suitable material.

An impervious barrier shall be provided on sites with a porous foundation (high permeability rate) where there is a need to protect ground water from contamination.

CONDITIONS WHERE PRACTICE APPLIES

This practice applies to urban, agricultural, recreational, or other frequently and intensively used areas requiring treatment to address one or more resource concerns.

Foundation preparation shall consist of removal and disposal of soil and other material that are not adequate to support the design loads.

CRITERIA

General Criteria Applicable to All Purposes

All planned work shall comply with federal, state, tribal and local laws and regulations. **Laws and**

Surface treatment. The surface treatment shall meet the following criteria:

**NRCS, MT
August 2004**

Conservation practice standards are reviewed periodically and updated if needed. To obtain the current version of this standard contact the Natural Resources Conservation Service.

NOTE: This type of font (**AaBbCcDdEe 123..**) indicates NRCS National Standards.
This type of font (**AaBbCcDdEe 123..**) indicates Montana Supplement.

Bituminous Pavement. The thickness of the pavement course, the kind and size of aggregate, the type of proportioning of bituminous materials, and the mixing and placing of these materials shall be in accordance with Department of Transportation criteria for the expected loading.

(See the "Standards and Specifications for Road and Bridge Construction" from the Montana Department of Highways and Montana Highway Commission.)

Frost action and shrink swell potential of the soils at the site should be evaluated for any hard surface treatments (pavement, concrete, etc.).

Concrete. The quality and thickness of concrete and the spacing and size of reinforcing steel shall be appropriate for the expected loading.

Other Cementitious Materials. Soil cement, roller-compacted concrete, and coal combustion by-products (flue gas desulfurization sludge and fly ash) may be used as surface material if designed and installed to withstand the anticipated loads and surface abrasion.

Aggregate. A fine or coarse aggregate surface shall be a minimum of 2 inches thick.

Other. Surfacing materials (such as cinders, tanbark, bark mulch, brick chips, shredded rubber, and/or sawdust) shall have a minimum layer thickness of 2 inches.

Structures. All structures shall be designed according to appropriate NRCS standards and specifications.

Sprays and artificial mulches. When utilizing sprays of asphalt, oil, plastic, manufactured mulches, and similar materials, the manufacturer's recommendations for application shall be incorporated into the design.

Drainage and erosion control. Provision shall be made for surface and subsurface drainage as needed and for disposal of runoff without causing erosion or water quality impairment. Provision shall be made to exclude unpolluted runoff water from the treatment area. All treatment areas shall be shaped to prevent ponding of water.

Vegetative Measures. Vegetative measures applied in this standard shall only be used on areas where traffic can be managed to maintain vegetative cover. Vegetative material shall be grass species or other plant materials that are wear resistant, have fast recovery from heavy use, and suitable to the site. Liming, fertilizing, soil preparation, seeding, mulching, sodding, and vegetation management shall be according to the planned use and appropriate NRCS conservation practice standards. If vegetation is not appropriate, other measures shall be used to accomplish the intended purpose.

Additional Criteria for Areas Utilized by Livestock

The treated area shall extend an appropriate distance from facilities such as portable hay rings, water troughs, feeding troughs, mineral boxes, and other facilities where livestock concentrations cause resource concerns.

The Field Office Technical Guide (FOTG), Section IV , Conservation Practice Standards Critical Area Planting - 342, Fencing - 382, Prescribed Grazing - 528A, Filter Strip - 393, Use Exclusion – 472 or Windbreak/Shelterbelt Establishment – 380, shall be used as companion practices, when needed, to meet the intended purpose of the heavy use area protection.

Provisions shall be made to collect, store, utilize, and/or treat manure accumulations and contaminated runoff in accordance with NRCS planning policy for Agricultural Waste Management Systems (AWMS) and Comprehensive Nutrient Management Plans (CNMP).

General Criteria for Livestock Fabricated Shelter

Fabricated shelters shall be located in areas where the herd is likely to congregate during typical storms. The site should be accessible by vehicle.

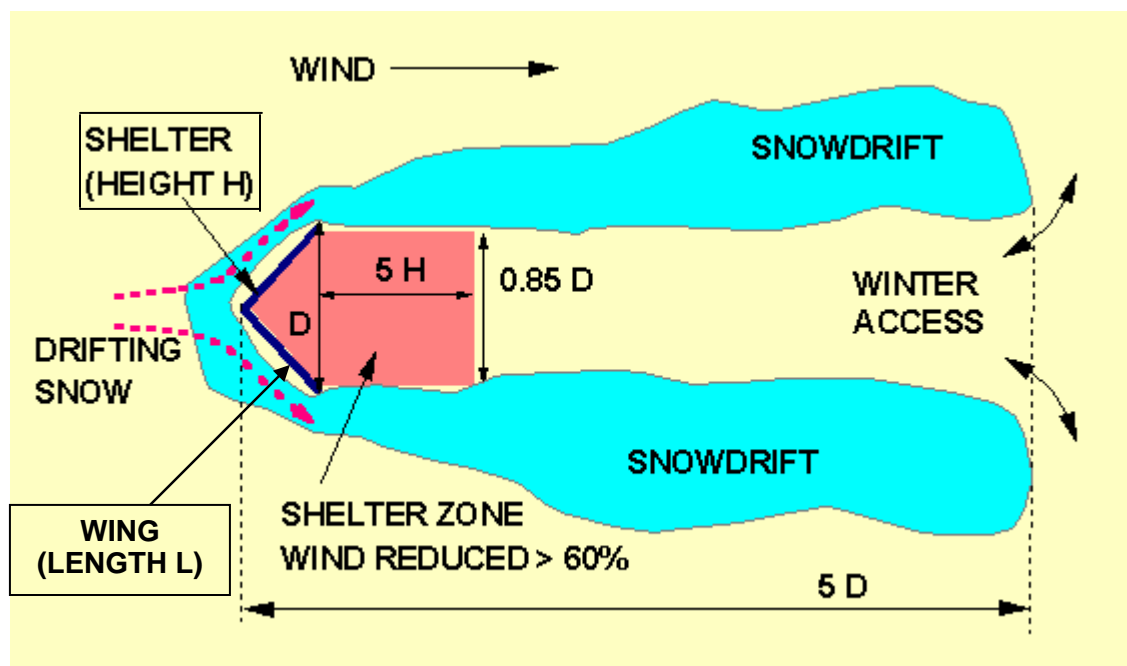


Figure A. Snowdrift Protection (Plan View)

Shelters designed for both wind and drifting snow must be constructed *in a semicircle or 90 degree V shape* with a solid face to divert drifting snow around ends of the barrier (Figure A). Straight solid (non-porous) shelters cause snowdrift problems if upwind snowtrapping capabilities (shelterbelts, snow fences, etc.), are not included. For guidance on shelterbelt and snow fence spacing, see Conservation Practice Standard, Windbreak/Shelterbelt Establishment - 380.

Semi-circular shelters are generally the most economical (material cost per protected square foot). They also tend to be self-bracing due to their shape.

The shelter length should be 10 to 15 times shelter height for straight line shelters. For 90° “V” shelters, the width (D) should be 10 to 15 times the shelter height. (A minimum length is needed to protect from eddy currents [whirlwinds] at shelter ends. If the shelter is too long, drifting snow is forced up, over the shelter into the protected area.)

Wind speed will typically be reduced 60-80% in the protected area behind the barrier. Design the shelter following Tables 1 and 2.

Table 1. Minimum Protected Area Needed.

	Beef cattle	Cow/calf	Sheep	Swine
ft ² /animal	25 - 35	40	8 - 10	15 - 20

The University of Wyoming (see references) uses 50 sq. ft. of drift-free area per beef animal for protected area requirements.

Table 2. Protected Area (see Figure A)

Barrier Height (ft)	Wing L (ft)	Width D (ft)	Drift-Free Area (ft ²)
6	60	84.8	3,964
8	80	113.1	7,047
10	105	148.5	11,823
12	125	176.8	16,828
14	145	205.1	22,714

Table 2 has been adjusted to accommodate for increased wind velocity at the end of the shelter.

Panel covering shall be minimum nominal 1-inch lumber, 28 gage coated corrugated steel, or similar durability material. Boards or panels

should be attached to the windward side of the shelter. Provide rub-rails or other features as needed to protect the structure from animal damage.

Wood installed in contact with the ground must be pressure treated (or equal). Where a fabricated shelter is to be constructed of wood, the structure shall be designed using NRCS approved methods for site-specific conditions, or sizes and spacing shown in Table 3 may be used.

Table 3. Minimum Wood Shelter Design.

Barrier Height (ft)	*Pole Length (ft)	Min. Depth (ft)	Pole Spacing (ft)	Girt Number and Size
6	8	3.5	8	3, 2x6
8	10	3.5	8	4, 2x6
10	12	4	8	5, 2x6
12	14	4	6	6, 2x4
14	16	4	4	7, 2x4

* (poles 8-inch or larger, small end up)

Minimum depth of embedment is based on exposed conditions, 40 – 45 m.p.h. wind speed, 80% solid area, one-foot ground gap, and 15-degree soil friction angle. Structural components are adequate for winds up to 80 m.p.h.

Criteria for Fence (Straight Line) Shelters

Porous barriers must have approximately 80% solid and 20% open surface area (Figure B).

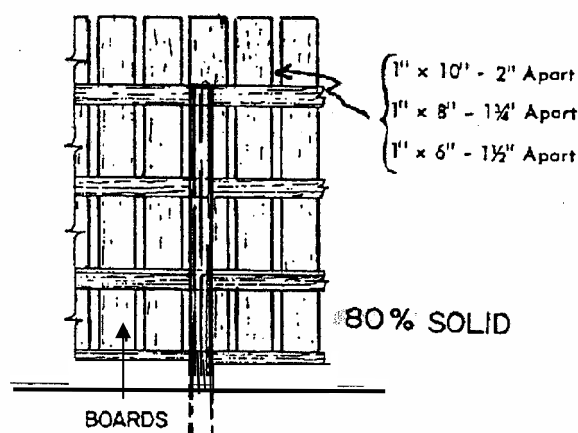


Figure B. 20 % Porous/80 % Solid Structure

Porous barriers must be mounted approximately 12 inches above the ground to

reduce eddy currents (whirlwinds) and allow wind to move snow downwind of the protected area.

Fence shelters may be designed either as solid barriers with upwind snow trapping capability for snow and wind or as porous barriers designed primarily for wind.

Fence barrier orientation should be approximately perpendicular to winter and early spring prevailing wind direction.

Criteria for Circular, Semi-circular, or 90° V-Shaped Shelters

These shelters must have solid face panel covering to divert drifting snow around the ends as shown in Figure A.

In areas with variable wind directions, semi-circular and 90° V-shaped shelters provide the best protection. These types display similar drifting patterns (Figure A) and provide a snow-free, reduced wind speed area for animals in protection zones. They provide the most protection without trapping animals behind snowdrifts. The “V”, or closed end, should point in the direction of winter and early spring prevailing winds.

Additional Criteria for Areas Utilized for Recreation

The treated area shall be conducive to the overall recreation area and aesthetically blend with the general landscape and surroundings. Plants, landscaping timbers, traffic control measures, wooden walkways, etc., shall be evaluated for effectiveness, aesthetics, and accessibility as covered by the Americans with Disabilities Act.

CONSIDERATIONS

When stabilizing heavily used areas, consider adjoining land uses and the proximity to residences, utilities, cultural resource areas, wetlands or other environmentally sensitive areas, and areas of special scenic value.

For heavy use areas conducive to protection by vegetation, consideration must be given to the effect(s) of treading and/or miring. The vegetative species selected should tolerate and persist under heavy use conditions. If practicable, consider increasing the size of the area and/or establishing a rest/non-use period to allow plant recovery and increase vigor.

Heavy use area protection effects on the water budget (especially on volumes and rates of runoff, infiltration, and transpiration due to the installation of less pervious surfaces) should be considered in the selection of surfacing materials.

The transport of sediments, nutrients, bacteria, organic matter from animal manures, oils and chemicals associated with vehicular traffic, and soluble and sediment-attached substances carried by runoff should be considered in selection of companion conservation practices.

Consider using additional air quality conservation practices such as **the Field Office Technical Guide (FOTG), Section IV, Practice Standards and Specifications, Windbreak/Shelterbelt Establishment – 380, or Herbaceous Wind Barriers – 603** to impede transport of particulate matter between the source (i.e., heavy use area) and nearby sensitive areas.

If the purpose of the heavy use area protection is improvement of water quality, the heavy use area should be (re)located as far away from the waterbody or watercourse as possible. Any work in and/or discharges near streams, wetlands or waterbodies may require a permit from the US Army Corps of Engineers, state water quality (permitting) authority, or local authority.

The size of heavy use areas utilized by livestock is dependent on the landowner's operation including type and number of animal, confinement periods, and/or the intended use. The size of treatment areas can range from 30 square feet per animal in partial-confinement to 400 square feet per animal in total confinement to 4000 or more square feet for animal exercise areas. Heavy use protection areas should be kept as small as practicable.

When surface treatments such as bark mulch, wood-fiber, or other non-durable materials are

used for short-term livestock containment areas, consideration should be given to vegetation of the affected area with a cover crop.

For areas with aggregate surfaces that will be frequently scraped, consideration should be given to the use of concrete or cementitious materials to lessen the recurring cost of aggregate replacement.

To reduce pavement damage due to frost action, consider the following:

- **Stronger, thicker sections**
- **Lowering water table by use of sub-drains or ditches**

Using layers of coarse sands in the sub-grade or waterproof sheets to reduce capillary action

- **Remove and replace frost susceptible materials down through the zone of frost penetration.**

Consideration should be given to site drainage. In areas lacking adequate natural drainage, constructed drains may be required.

Supporting practices should be applied where water erosion, nutrient runoff, and/or runoff from melting snow may be a hazard.

Consideration should be given to offsite effects.

Consider locating shelters at least 185 feet up wind from buildings; cattle yard areas, feed storage, etc. to avoid snow accumulation in those areas. Wind velocities increase 10-20 percent and higher when it goes around the end of a shelter.

PLANS AND SPECIFICATIONS

Plans and specifications for heavy use area protection shall meet this standard and shall describe the requirements needed to achieve the purpose.

Specifications should provide guidance to prevent the spread of noxious weeds. All equipment brought in to the site for installation of this practice shall be thoroughly cleaned and washed.

Plans and specifications shall include construction plans, drawings, job sheets, or other similar documents. These documents shall specify the requirements for installing the practice, including the kind, amount, and quality of materials to be used.

OPERATION AND MAINTENANCE

An operation and maintenance (O&M) plan shall be prepared for and reviewed with the landowner or operator. The plan shall specify that the treated areas and associated practices are inspected annually and after significant storm events to identify repair and maintenance needs.

For livestock operations, the O&M plan for heavy use areas may be included as a part of the overall waste management plan. Periodic removal and management of manure accumulations will be addressed in the O&M plan.

A plan for regular weed control should be developed as needed to maintain the site.

The fabricated shelters must be inspected periodically and any damage will be repaired to maintain proper function. Repair and upkeep of structures will include replacement of broken or damaged wood slats, fiberglass, or corrugated metal.

REFERENCES

American Society for Testing and Materials (ASTM) D 698

American Association of Highway Transportation Officials (AASHTO) M-288 (latest edition)

NRCS National Engineering Handbook Part 642 Specifications

Jairell, R. L. and R. A. Schmidt. 1991. Taming Blizzards for Animal Protection, Drift Control, and Stock Water. Proceedings, The Range

Beef Cow Symposium XII, Dec. 3-5, 1991, Fort Collins, CO, 11 pages.

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